

said third and said fourth arcuate sections each having a first diameter;
and
a ratio of said total length to said first diameter is at least 1:1, whereby
said claw-pole permanent magnet stepping motor has a reduced size,
eliminates magnetic circuit obstructions, and prevents external flux
leakage to allow use with magnetic devices while providing an adequate
rotational torque;
said third and said fourth arcuate sections each have a first thickness;
said fifth and said sixth wall sections each have a second thickness; and
said first thickness being greater than said second thickness, whereby size
is reduced, magnetic circuit obstructions are eliminated, and external flux
leakage is minimized;
said fifth and said sixth wall sections each having a planar shape and
being closer to said rotor than said third and said fourth arcuate sections;
and
said at least first case unit having a flattened-oval cross section, whereby
said claw-pole permanent magnet stepping motor has a reduced size;
a first thin wall section on each said fifth and said sixth sections
orthogonal each said third and said fourth arcuate sections;
said first thin wall section having a third thickness; and
said third thickness being less than said second thickness, whereby said
claw-pole permanent magnet stepping motor may be made with an
increased torque while retaining a same external size.

6. (Cancelled)
7. (Currently Amended) A claw-pole permanent magnet stepping motor,
comprising:
a first case unit having a length wherein said first case unit is continuous
along its length;

a second case having a length wherein said second case unit is continuous along its length;

a first and a second case unit having a total length wherein a material forming said first and second case units is magnetic;

a rotor having at least a first and a second permanent magnet;

said first and said second case units having an oval shape supporting said rotor;

a third and a fourth arcuate section on each said first and said second case units;

a fifth and a sixth side wall section joining each respective said third and fourth arcuate sections in a continuous flattened-oval shape about said rotor;

said third and said fourth arcuate sections each having a first diameter;

said total length and said first diameter having a ratio of at least 1:1;

said third and said fourth arcuate sections each have a first thickness;

said fifth and said sixth wall sections each have a second thickness;

said first thickness being greater than said second thickness;

said fifth and said sixth sections each having a planar shape and being closer to said rotor than said third and said fourth arcuate sections;

said at least first case unit having a flattened-oval cross section, whereby said claw-pole permanent magnet stepping motor has a reduced size, eliminates magnetic circuit obstructions, and prevents external flux leakage to allow use with magnetic devices while providing an adequate rotational torque;

a first metal bearing in said first case unit;

a second metal bearing in said second case unit;

said rotor supported between said first and said second metal bearings;

a plurality of magnetic poles on said first and second permanent magnets;

a first and a second phase inductor in each respective said first and said

second unit case opposite each respective said first and second permanent magnet;

said first and said second phase inductors disposed symmetrically in each respective said first and said case units; and

said first and said second phase inductors each formed from at least a first and a second magnetic plate each having multiple claw-poles and a first and a second coil each with a set of connectors, at least one of said claw-poles facing the continuous flattened-oval section of the fifth and sixth side walls, whereby said adequate rotational torque is created.

8. (Original) A claw-pole permanent magnet stepping motor, according to claim 7, wherein:
said ratio is preferably 2:1.
9. (Currently Amended) A claw-pole permanent magnet stepping motor, comprising:
a first case unit having a length wherein said first case unit is continuous along its length;
a second case having a length wherein said second case unit is continuous along its length;
said first case unit and said second case unit having a first total length wherein a material forming said first and second case units is magnetic;
a rotor including a first and a second permanent magnet;
said first and said second case units having an oval shape which comprises an arcuate section and a flattened-oval section supporting said rotor;
a permanent magnet magnetized to form a plurality of poles;
said permanent magnet on said rotor;
a first phase inductor;
a second phase inductor;

said first and said second phase inductors disposed symmetrically in each respective said case unit;

said first and said second phase inductors each including at least a plurality of claw poles and a coil at least one of said claw-poles facing the continuous flattened-oval section of the case units;

said first and said second case units having a first diameter; and

a ratio of said first total length to said first diameter is at least 1:1,

whereby said claw-pole permanent magnet stepping motor has a reduced size, eliminates magnetic circuit obstructions, and prevents external flux leakage to allow use with magnetic devices while providing an adequate rotational torque.

10. (Original) A claw-pole permanent magnet stepping motor, according to claim 9, wherein:

said ratio is preferably 2:1, whereby said adequate rotational torque is maintained.

11. (Original) A claw-pole permanent magnet stepping motor, according to claim 10, further comprising:

a securing section detachably attached to an outside side surface of at least one of said first and said second case unit;

a securing section containing an externally threaded section; and

said securing section being detachably fixable to an external attachment base for said claw-pole permanent magnet stepping motor, whereby said claw-pole permanent magnet stepping motor may be easily affixed to an external device.

12. (Previously Presented) A claw-pole permanent magnet stepping motor, according to claim 11 wherein:

each said first and said second phase inductor includes said coil and a

magnetic plate formed integrally from a magnetic material;
each said magnetic plate having an oval shape, including a flat oval-shaped section and an extending plurality of claw-poles, for sliding insertion in each respective said first and said second case unit, whereby assembly time is reduced and efficiency increased.

13. (Original) A claw-pole permanent magnet stepping motor, according to claim 12, wherein:
each said coil includes a coil bobbin; an insulated copper wire wrapped around said coil bobbin, and a connector;
said coil bobbin including a first and a second collar;
said connector disposed at at least one of said first and said second collar orthogonal to said coil; and
said coil bobbin having a flat oval shape with arcuate sections, whereby said coils are quickly install-able inside each respective said first and said second case units.